NASA SBIR/STTR Technologies

Proposal No. S1.08-9403 - A Compact LIDAR for Aerosol Extinction Profiling from Small UAVs

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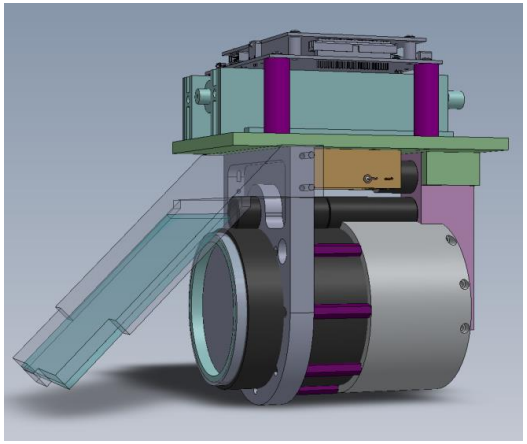
Identification and Significance of Innovation

- Physical Sciences Inc. proposes to develop a compact, eye-safe lidar payload for vertical profiling of aerosol extinction that will be deployable on a compact UAS like the SIERRA.
- Our design is a compact elastic backscatter lidar that includes an innovative, low power consumption, compact Nd:YLF laser transmitter, along with High Density Interconnect (HDI)-based system electronics.
- The lidar will provide range-resolved profiles of aerosol extinction by taking advantage of the maneuverability of the small UAS to acquire both horizontal and nadir measurements as a function of altitude.
- A lidar-equipped UAS could provide increased spatial coverage of aerosol extinction useful for improved climate models.

Expected TRL Range at the end of Contract (1-9): 3

CAD model of SIERRA – UAS Compact Lidar



Technical Objectives and Work Plan

The technical objectives of the Phase I program are to:

- Create a sensor architecture that will provide the needed measurement performance.
- Demonstrate that the lidar design can be packaged into a volume consistent with the payload resources of the target aircraft (SIERRA).
- Create a plan for the demonstration of the sensor payload.

The Work Plan includes these tasks:

- Kickoff Meeting
- Lidar design
- Payload engineering design
- Payload-platform integration design
- Demonstration planning

NASA and Non-NASA Applications

NASA Application:

- The UAS lidar has value for applications requiring measurement of aerosols where sensor size is critical to performance.
- Relevant NASA missions are GEO-CAPE and DISCOVER-AQ.
- The UAS lidar is also relevant to monitoring volcanic emissions, as for example the work of David Pieri of JPL at the Turrialba Volcano, San Jose, Costa Rica. This work used instrumented Dragon Eye UAVs and plans to use the SIERRA.

Non-NASA Commercial Applications:

- Ground-based applications such as visibility and Asian dust monitoring, hazardous volcanic ash cloud monitoring, regional air quality, human health assessments, and CBRNE detection.
- Introduction into newly emerging networks for boundary layer meteorology may also be possible.

Firm Contacts

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